CURRICULUM VITÆ OF IVAN C. CHRISTOV

Current position: Richard P. Feynman Distinguished Postdoctoral Fellow in Theory and Computing

Affiliation(s): Physics of Condensed Matter and Complex Systems group (T-4)
and Center for Nonlinear Studies, Los Alamos National Laboratory

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Objective:

Obtain a research-oriented position, either in academia or in industry, in a field closely related to my research interests and experience in the applied mathematical sciences, specifically the theory and computation of transport phenomena and the mechanics of complex fluids.

Education:

- **Ph.D. in Applied Mathematics** — Northwestern University, Evanston, IL. (Sept. 2007–June 2011)
  - ⇒ Advisors: Julio M. Ottino and Richard M. Lueptow.
  - ⇒ Dissertation: "From Streamline Jumping to Strange Eigenmodes and Three-Dimensional Chaos: A Tour of the Mathematical Aspects of Granular Mixing in Rotating Tumblers." UMI:3456537
- **M.S. in Applied Mathematics** — Northwestern University, Evanston, IL. (Sept. 2007–June 2008)
- **M.S. in Mathematics** — Texas A&M University, College Station, TX. (Aug. 2005–May 2007)
- **S.B. in Mathematics** — Massachusetts Institute of Technology, Cambridge, MA. (Sept. 2002–June 2005)

Research Interests:

- **Complex and Nonlinear Systems:** the study of the mechanics of natural phenomena using advanced mathematical techniques and state-of-the-art computational simulations; in particular: diffusion, mixing and self-organization of granular matter, flow in heterogeneous porous media, multiphase interfacial instabilities, fluid-structure interaction, shock-formation in compressible flows, viscoelastic flows and non-Newtonian rheology, dynamics of coherent structures in nonlinear wave equations, nonlinear Fourier analysis of physical data.
- **Numerical Methods/Analysis:** the development of high-performance reliable simulation techniques for real-world applications; in particular: Godunov-type schemes for conservation laws and Hamilton–Jacobi equations, finite-volume methods for reservoir simulation, implicit conservative finite-difference and finite element methods for nonlinear diffusion and nonlinear wave equations.

Work/Research Experience:

- **Los Alamos National Laboratory, Theoretical Division and Center for Nonlinear Studies** (July 2013–present) Studying the statistical mechanics of universal emergent behaviors (clustering, ordering, topology) that arise from the interplay between discontinuous granular mixing dynamics and microscopic physics, and the role of granular materials in unconventional fossil fuel recovery techniques such as hydraulic fracturing, as Richard P. Feynman Distinguished Postdoctoral Fellow, hosted by Drs. E. Ben-Naim and R.E. Ecke, funded by the LANL/LDRD program.
- **Princeton University, Department of Mechanical and Aerospace Engineering** (Sept. 2011–June 2013) Showed that anomalous diffusive scalings of granular materials in rotating tumblers can be understood within the Fickian theory of diffusion. Derived the nonlinear flow-rate pressure drop relationship for soft microfluidic channels that are shallow and long. Studied, theoretically and experimentally, the flow and dispersal of particulate suspensions with applications to problems in drug delivery, filtration and separation, as NSF Mathematical Sciences Postdoctoral Research Fellow in the Complex Fluids Group of Prof. H.A. Stone, funded by NSF Grant DMS-1104047 (PI: I.C.C.).
- **University of Oxford, Oxford Centre for Collaborative Applied Mathematics** (Sept. 2012) Developed models for Taylor–Aris dispersion of passive and active suspensions, and derived mathematically rigorous asymptotic descriptions of such phenomena, as a Short Term Visitor hosted by Dr. I.M. Griffiths.

- **Northwestern University, McCormick School of Engineering and Applied Science** (Sept. 2008–Aug. 2011) Discovered a new mechanism of granular mixing ("streamline jumping") in slowly-rotated containers with a vanishingly-thin flowing layer and studied these new modalities of mixing and three-dimensional chaotic transport in the resulting dynamical system, as a Graduate Research Assistant and Postdoctoral Fellow under the direction of Profs. J.M. Ottino and R.M. Lueptow, funded, in part, by a Walter P. Murphy fellowship and NSF Grant CMMI-1000469.

- **ExxonMobil Upstream Research Company** (June 2008–Sept. 2008) Designed and implemented efficient higher-order finite volume methods for the hyperbolic multiphase, multicomponent fluid flow equations on unstructured Voronoi meshes and applied these techniques to problems in reservoir simulation as a Summer Intern; supervised by Dr. Ilya D. Mishev.

- **U.S. Naval Research Laboratory, Stennis Space Center** (June 2007–Aug. 2007) Investigated the formation & propagation of acoustic, thermal and traffic shock waves, and applied nonlinear Fourier analysis to data of internal solitary waves in the ocean as a Summer Intern with the Acoustics Division; joint work with Drs. P.M. Jordan, S.A. Chin-Bing and A.C. Warn-Varnas, funded by the Naval Research Enterprise Intern Program.

- **Texas A&M University, Department of Mathematics** (Aug. 2006–May 2007) Designed, implemented and benchmarked a new nonoscillatory Godunov-type central scheme for solving hyperbolic systems of nonlinear conservation laws on unstructured triangulations as a Graduate Research Assistant; joint work with Prof. Bojan Popov, funded, in part, by NSF grant DMS-0510650.

- **U.S. Naval Research Laboratory, Stennis Space Center** (June 2005–Aug. 2005) Investigated acoustic shock formation & propagation, and applied nonlinear Fourier analysis to data of internal solitary wave in the ocean as a Summer Intern with the Acoustics Division; joint work with Drs. P.M. Jordan and S.A. Chin-Bing, funded by NRL's Student Summer Employment Program.

- **Massachusetts Institute of Technology, Department of Mathematics** (Sept. 2004–June 2005) Developed simulation tools for investigating the breaking of internal waves in two-dimensional stratified, rotating lakes under gravity; joint work with Prof. Roman Stocker, funded by MIT's Undergraduate Research Opportunities Program.

- **Texas A&M University, Department of Mathematics** (June 2004–Aug. 2004) Investigated the wavelet-Galerkin solution to the Korteweg–de Vries equation at the Research Experience for Undergraduates program on "Wavelets and Matrix Analysis"; supervised by Prof. D.R. Larson and funded through NSF grant DMS-0243822.

- **Massachusetts Institute of Technology, Department of Mathematics** (Feb. 2004–June 2004) Investigated image anti-aliasing using a wavelet edge detection algorithm; supervised by Prof. Gilbert Strang and funded by MIT's Undergraduate Research Opportunities Program.

- **Texas A&M University, Department of Mathematics** (June 2003–Aug. 2003) Investigated wavelet-Galerkin methods for partial differential equations at the Research Experience for Undergraduates program on "Wavelets and Matrix Analysis"; supervised by Prof. D.R. Larson and funded by NSF grant DMS-0243822.

- **McNair Science and Technology Program** (Sept. 2002–June 2003) Mentored Boston public school students on science fair projects.

- **Laser Interferometer Gravitational Wave Observatory, Livingston** (June 2002–Aug. 2002) Investigated decorrelation of interferometer signals as a Summer Undergraduate Research Fellow; supervised by Prof. Rainer Weiss (MIT).

Publications:

(* indicates corresponding author(s), if applicable; ➤ denotes a key publication.)

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Forthcoming:

(Preprints available upon request.)

3. Ivan C. Christov, "On a hierarchy of nonlinearly dispersive generalized KdV equations," submitted to the *Proceedings of the Estonian Academy of Sciences*; arXiv:1501.01044.

2. Zhong Zheng, Bo Guo, Ivan C. Christov, Michael A. Celia, Howard A. Stone,* "Flow regimes for fluid injection into a confined porous medium," in revision for *Journal of Fluid Mechanics*.

1. Ivan C. Christov, P.M. Jordan,* S.A. Chin-Bing, A. Warn-Varnas, "Acoustic traveling waves in thermoviscous perfect gases: Kinks, acceleration waves, and shocks under the Taylor–Lighthill balance," *Mathematics and Computers in Simulation* (Special Issue on Nonlinear Waves: Computation and Theory), to appear, doi:10.1016/j.matcom.2013.03.011.

In Refereed Journals:

32. Avinash Khare, Ivan C. Christov, Avadh Saxena, "Successive phase transitions and kink solutions in ϕ^8, ϕ^{10}, and ϕ^{12} field theories," *Physical Review E* **90** (2014) 023208, doi:10.1103/PhysRevE.90.023208; arXiv:1402.6766.

➤ 31. Ivan C. Christov,* Howard A. Stone, "Shear dispersion in dense granular flows," *Granular Matter* **16** (2014) 509–515, doi:10.1007/s10035-014-0498-0; arXiv:1402.6765.

30. Ivan C. Christov, Richard M. Lueptow, Julio M. Ottino, Rob Sturman, "A Study in Three-Dimensional Chaotic Dynamics: Granular Flow and Transport in a Bi-Axial Spherical Tumbler," *SIAM Journal on Applied Dynamical Systems* **13** (2014) 901–943, doi:10.1137/130934076; arXiv:1404.4660.

29. Zhong Zheng, Ivan C. Christov, Howard A. Stone,* "Influence of heterogeneity on second-kind self-similar solutions for viscous gravity currents," *Journal of Fluid Mechanics* **747** (2014) 218–246, doi:10.1017/jfm.2014.148.

28. Ivan C. Christov, P.M. Jordan,* "On an instability exhibited by the ballistic-diffusive heat conduction model of Xu and Hu," *Proceedings of the Royal Society A* **470** (2014) 20130557, doi:10.1098/rspa.2013.0557.

27. Talal T. Al-Housseiny,* Ivan C. Christov, Howard A. Stone, "Two-Phase Fluid Displacement and Interfacial Instabilities Under Elastic Membranes," *Physical Review Letters* **111** (2013) 034502, doi:10.1103/PhysRevLett.111.034502.

➤ 26. Ivan C. Christov, "On a difficulty in the formulation of initial and boundary conditions for eigenfunction expansion solutions for the start-up of fluid flow," *Mechanics Research Communications* **51** (2013) 86–92, doi:10.1016/j.mechrescom.2013.05.005; arXiv:1305.5999.

25. Conor P. Schlick, Ivan C. Christov, Paul B. Umbanhowar, Julio M. Ottino, Richard M. Lueptow,* "A mapping method for distributive mixing with diffusion: Interplay between chaos and diffusion in time-periodic sine flow," *Physics of Fluids* **25** (2013) 052102, doi:10.1063/1.4803897.

24. Marissa K. Krotter, Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "Cutting and Shuffling a Line Segment: Mixing by Interval Exchange Transformations," *International Journal of Bifurcation and Chaos* **22** (2012) 1230041, doi:10.1142/S0218127412300418; arXiv:1208.2052. ⋆ Cover article.

➤ 23. Ivan C. Christov,* Howard A. Stone, "Resolving a paradox of anomalous scalings in the diffusion of granular materials," *Proceedings of the National Academy of Sciences of the USA* **109** (2012) 16012–16017, doi:10.1073/pnas.1211110109.

22. Florent Pignatel, Caroline Asselin, Lucas Krieger, Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "Parameters and scalings for dry and immersed granular flowing layers in rotating tumblers," *Physical Review E* **86** (2012) 011304, doi:10.1103/PhysRevE.86.011304.

21. Ivan C. Christov, "Hidden solitons in the Zabusky–Kruskal experiment: Analysis using the periodic, inverse scattering transform," *Mathematics and Computers in Simulation* **82** (2012) 1069–1078, doi:10.1016/j.matcom.2010.05.021; arXiv:0910.3345.

20. Gabriel Juarez, Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "Mixing by cutting and shuffling 3D granular flow in spherical tumblers," *Chemical Engineering Science* **73** (2012) 195–207, doi:10.1016/j.ces.2012.01.044.

19. Ivan C. Christov,* P.M. Jordan, "Comments on: "Starting solutions for some unsteady unidirectional flows of a second grade fluid," [Int. J. Eng. Sci. 43 (2005) 781]," *International Journal of Engineering Science* **51** (2012) 326–332, doi:10.1016/j.ijengsci.2011.10.012; arXiv:1111.4464.

18. Richard S. Keiffer, R. McNorton, P.M. Jordan, Ivan C. Christov,* "Dissipative acoustic solitons under a weakly-nonlinear, Lagrangian-averaged Euler-α model of single-phase lossless fluids," *Wave Motion* **48** (2011) 782–790, doi:10.1016/j.wavemoti.2011.04.013.

17. Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "From streamline jumping to strange eigenmodes: Bridging the Lagrangian and Eulerian pictures of the kinematics of mixing in granular flows," *Physics of Fluids* **23** (2011) 103302, doi:10.1063/1.3653280.

16. Ivan C. Christov, "Comments on: "Energetic balance for the Rayleigh–Stokes problem of an Oldroyd-B fluid" [Nonlinear Anal. RWA 12 (2011) 1]," *Nonlinear Analysis: Real Words Applications* **12** (2011) 3687–3690, doi:10.1016/j.nonrwa.2011.06.025; arXiv:1107.2947.

15. Ivan C. Christov, Richard M. Lueptow, Julio M. Ottino,* "Stretching and folding versus cutting and shuffling: An illustrated perspective on mixing and deformations of continua," *American Journal of Physics* **79** (2011) 359–367, doi:10.1119/1.3533213; arXiv:1010.2256.

14. Ivan C. Christov, C.I. Christov, "An improved formula for the frequency shift due to a variable phase speed," *Journal of Physics A: Mathematical and Theoretical* **44** (2011) 112001, doi:10.1088/1751-8113/44/11/112001.

13. Ivan C. Christov, "Stokes' first problem for some non-Newtonian fluids: Results and mistakes," *Mechanics Research Communications* **37** (2010) 717–723, doi:10.1016/j.mechrescom.2010.09.006; arXiv:1009.4416.

12. Ivan C. Christov,* C.I. Christov, "Comment on "On a class of exact solutions of the equations of motion of a second grade fluid" by C. Fetecău and J. Zierep (Acta Mech. 150, 135–138, 2001)," *Acta Mechanica* **215** (2010) 25–28, doi:10.1007/s00707-010-0300-2; arXiv:1003.2188.

11. Ivan C. Christov,* P.M. Jordan, "On the Propagation of Second-Sound in Nonlinear Media: Shock, Acceleration and Traveling Wave Results," *Journal of Thermal Stresses* **33** (2010) 1109–1135, doi:10.1080/01495739.2010.517674.

10. Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "Chaotic mixing via streamline jumping in quasi-two-dimensional tumbled granular flows," *Chaos* **20** (2010) 023102, doi:10.1063/1.3368695.

9. Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow,* "Streamline jumping: A mixing mechanism," *Physical Review E* **81** (2010) 046307, doi:10.1103/PhysRevE.81.046307.

8. Ivan Christov, "Internal solitary waves in the ocean: Analysis using the periodic, inverse scattering transform," *Mathematics and Computers in Simulation* **80** (2009) 192–201, doi:10.1016/j.matcom.2009.06.005; arXiv:0708.3421.

7. Ivan Christov, P.M. Jordan,* "Shock and traveling wave phenomena on an externally damped, non-linear string," *International Journal of Non-Linear Mechanics* **44** (2009) 511–519, doi:10.1016/j.ijnonlinmec.2008.12.004.

6. Ivan Christov, Bojan Popov,* "New non-oscillatory central schemes on unstructured triangulations for hyperbolic systems of conservation laws," *Journal of Computational Physics* **227** (2008) 5736–5757, doi:10.1016/j.jcp.2008.02.007.

5. Ivan Christov, P.M. Jordan,* "Shock bifurcation and emergence of diffusive solitons in a nonlinear wave equation with relaxation," *New Journal of Physics* **10** (2008) 043027, doi:10.1088/1367-2630/10/4/043027.

4. Ivan Christov,* C.I. Christov, "Physical dynamics of quasi-particles in nonlinear wave equations," *Physics Letters A* **372** (2008) 841–848, doi:10.1016/j.physleta.2007.08.038; arXiv:nlin/0612005.

3. Ivan Christov, C.I. Christov, P.M. Jordan,* "Modeling weakly nonlinear acoustic wave propagation," *The Quarterly Journal of Mechanics and Applied Mathematics* **60** (2007) 473–495, doi:10.1093/qjmam/hbm017.

   - See also: Corrigendum and Addendum, *ibid.* **68** (2015) ???–???, doi:10.1093/qjmam/hbu023.

2. Ivan Christov, C.I. Christov, P.M. Jordan,* "Cumulative Nonlinear Effects in Acoustic Wave Propagation," *CMES: Computer Modeling in Engineering & Sciences* **17** (2007) 47–54, doi:10.3970/cmes.2007.017.047.

1. Ivan Christov, P.M. Jordan,* C.I. Christov, "Nonlinear acoustic propagation in homentropic perfect gases: A numerical study," *Physics Letters A* **353** (2006) 273–280, doi:10.1016/j.physleta.2005.12.101.

In Refereed Proceedings/Edited Volumes:

7. Ivan C. Christov, "Wave Solutions," invited contribution in *Encyclopedia of Thermal Stresses* (2014), ed. R.B. Hetnarski, Springer, 6495–6506, doi:10.1007/978-94-007-2739-7_33; arXiv:1208.3622.

6. Ivan Christov, Ilya D. Mishev, Bojan Popov, "Finite volume methods on unstructured Voronoi meshes for hyperbolic conservation laws," in *Hyperbolic Problems: Theory, Numerics and Applications*, eds. E. Tadmor, J.-G. Liu, A.E. Tzavaras, Proceedings of Symposia in Applied Mathematics **67** (2009) 507–516.

5. I.C. Christov, C.I. Christov, "On the Inertial Force Experienced by a Solid Body Undergoing Rotation about Two Axes," in *Proceedings of the 1st International Conference on Applications of Mathematics in Technical and Natural Sciences (Sozopol, Bulgaria)*, eds. M.D. Todorov, C.I. Christov, AIP Conference Proceedings **1186** (2009) 226–230, doi:10.1063/1.3265333.

4. Ivan Christov, C.I. Christov, "The coarse-grain description of interacting sine-Gordon solitons with varying widths," in *Dynamical Systems and Differential Equations: Proceedings of the 7th AIMS International Conference (Arlington, TX, USA)*, eds. X. Hou, X. Lu, A. Miranville, J. Su, J. Zhu, Discrete and Continuous Dynamical Systems (DCDS) Supplement (2009) 171–180.

3. Ivan Christov, "Thermal shock waves under a Maxwell–Cattaneo model with temperature-dependent conductivity," *Proceedings of The Eighth International Congress on Thermal Stresses* (2009), eds. M. Ostoja-Starzewski, P. Marzocca, vol. II, 525–528.

2. James A. Hawkins, Alex Warn-Varnas, Ivan Christov, "Fourier, Scattering, and Wavelet Transforms: Applications to Internal Gravity Waves with Comparisons to Linear Tidal Data," in *Nonlinear Time Series Analysis in the Geosciences: Applications to Climatology, Geodynamics and Solar-Terrestrial Physics*, eds. R.V. Donner, S.M. Barbosa, Springer Lecture Notes in Earth Sciences **112** (2008) 223–244, doi:10.1007/978-3-540-78938-3_10.

1. Stanley A. Chin-Bing, Alex C. Warn-Varnas, David B. King, Ivan Christov, "Using Ocean Acoustics to Improve Large Shallow-water Soliton Simulations," *Proceedings of MTS/IEEE Oceans 2007 Conference* (2007) 1754–1758, doi:10.1109/OCEANS.2007.4449377.

Other:

7. Ivan C. Christov, "From Streamline Jumping to Strange Eigenmodes and Three-Dimensional Chaos: A Tour of the Mathematical Aspects of Granular Mixing in Rotating Tumblers," Ph.D. Thesis (2011), Northwestern University, Evanston, Illinois. UMI:3456537

6. Julio M. Ottino, Richard M. Lueptow, Ivan C. Christov, "DynSyst_Special_Topics: A Dynamical Systems Approach to Mixing and Segregation of Granular Matter," *Proceedings of the 2011 NSF Engineering Research and Innovation Conference*, January 4–7, 2011, Atlanta, Georgia.

5. Ivan Christov, Ilya D. Mishev, Bojan Popov, "Finite Volume Methods on Unstructured Voronoi Meshes for Hyperbolic Conservation Laws," Preprint IAMCS-2008-030 (2008), Institute for Applied Mathematics and Computational Science, Texas A&M University.

4. Ivan Christov, Bojan Popov, "A Jiang–Tadmor Scheme on Unstructured Triangulations," Technical Report ISC-06-05-MATH (2006), Institute for Scientific Computation, Texas A&M University.

3. Jeff Baker, Ivan Christov, Simona Dediu, Elana Fertig, Wanda Strychalski, "Properties of a Gradient Descent Algorithm for Active Vibration Control," *Proceedings of the Twelfth Industrial Mathematical and Statistical Modeling Workshop for Graduate Students*, eds. A. Chertock, M.A. Haider, M.S. Olufsen, R.C. Smith, Technical Report CRSC-TR06-23 (2006) 89–108, Center for Research in Scientific Computation, North Carolina State University.

2. Ivan Christov, "Shock Waves in a Tube," *MIT Undergraduate Journal of Mathematics* **7** (2005) 23–34.

1. Ivan Christov, "Integrating the Normal Curve," *FOLIO: Literary Journal of the Louisiana School for Math Science and the Arts* (2002) 5–8.

Talks & Presentations:

Invited Seminars and Colloquia:

- **February 10, 2015** "Low Reynolds number flows through shaped and deformable conduits," Seminar, Department of Mechanical Engineering, Iowa State University, Ames, Iowa.

- **February 6, 2015** "Low Reynolds number flows through shaped and deformable conduits," Colloquium, Department of Mathematics, University of British Columbia, Vancouver, Canada.

- **January 29, 2015** "Low Reynolds number flows through shaped and deformable conduits," MechSE Seminar, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois.
- **January 22, 2015** "Low Reynolds number flows through shaped and deformable conduits," Colloquium, Department of Mathematics, Temple University, Philadelphia, Pennsylvania.
- **November 21, 2014** "Low Reynolds number flows through shaped and deformable conduits," AMS Colloquium, Applied Mathematics & Statistics, Colorado School of Mines, Golden, Colorado.
- **October 13, 2014** "Low Reynolds number flows through shaped and deformable conduits," Applied Math Seminar, Department of Mathematics & Statistics, The University of New Mexico, Albuquerque, New Mexico.
- **September 26, 2014** "Low Reynolds number flows through shaped and deformable conduits," ME Seminar, Department of Mechanical Engineering, The University of New Mexico, Albuquerque, New Mexico.
- **December 11, 2013** "Chaotic mixing of granular materials," Applied and Computational Mathematics Seminar, Department of Mathematics, University of Wisconsin–Madison, Madison, Wisconsin.
- **November 19, 2013** "Transport phenomena in flows of granular materials," Mathematical Sciences Colloquium, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, New York.
- **November 7, 2013** "Transport phenomena in flows of granular materials," Applied Math Lab Seminar, Courant Institute of Mathematical Sciences, Department of Mathematics, New York University, New York, New York.
- **October 18, 2013** "Transport phenomena in flows of granular materials," Department of Mathematics Colloquium, University of Nebraska–Lincoln, Lincoln, Nebraska.
- **October 17, 2013** "Two case studies in nonlinear Fourier analysis: Ocean internal solitary waves and the Zabusky–Kruskal solitons," Continuum Mechanics Seminar, Department of Mathematics, University of Nebraska–Lincoln, Lincoln, Nebraska.
- **April 15, 2013** "Diffusion in flows of granular materials," Fluid Mechanics Seminar, Department of Mathematical Sciences, New Jersey Institute of Technology, Newark, New Jersey.
- **March 7, 2013** "Diffusion in flows of granular materials," Ergodic Theory & Statistical Mechanics Seminar, Department of Mathematics, Princeton University, Princeton, New Jersey.
- **March 4, 2013** "Transport phenomena in flows of granular materials," Faculty Candidate Seminar, George W. Woodruff School of Mechanical Engineering, Georgia Tech, Atlanta, Georgia.
- **March 1, 2013** "Transport phenomena in flows of granular materials," Seminar, Department of Mechanical and Aerospace Engineering, UC San Diego, San Diego, California.
- **February 22, 2013** "Transport phenomena in flows of granular materials," Special Applied Mathematics Colloquium, Department of Applied Physics and Applied Mathematics, Columbia University, New York, New York.
- **February 12, 2013** "Transport phenomena in flows of granular materials," Seminar, Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico.
- **February 6, 2013** "Transport phenomena in flows of granular materials," Numerical Analysis Seminar, Department of Mathematics, Texas A&M University, College Station, Texas.
- **Januray 23, 2013** "Transport Phenomena in Flows of Granular Materials," Special Mathematics Colloquium, Florida State University, Tallahassee, Florida.
- **January 15, 2013** "Transport phenomena in flows of granular materials," Special Seminar, North Carolina State University, Raleigh, North Carolina.
- **December 11, 2012** "Transport phenomena in flows of granular materials," Analysis, Dynamics, and Applications Seminar, The University of Arizona, Tucson, Arizona.
- **October 18, 2012** "Transport phenomena in flows of granular materials," Mechanical Engineering Thursday Seminar, The Johns Hopkins University, Baltimore, Maryland.

- **October 3, 2012** "Two case studies in nonlinear Fourier analysis: Ocean internal solitary waves and the Zabusky–Kruskal solitons," Solitons, Coherence and Geometry Seminar, Institute for Nuclear Research and Nuclear Energy at the Bulgarian Academy of Sciences, Sofia, Bulgaria.
- **October 2, 2012** "Transport phenomena in flows of granular materials," Parallel Algorithms and Scientific Computations Seminar, Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences, Sofia, Bulgaria.
- **September 12, 2012** "Diffusion and Dispersion in Flows of Granular Materials," Oxford Collaborative Development Workshop, Oxford Centre for Collaborative Applied Mathematics, University of Oxford, United Kingdom.
- **April 18, 2012** "Chaotic dynamics in granular flows from the Eulerian and Lagrangian perspectives," Mechanical and Industrial Engineering Colloquium, New Jersey Institute of Technology, Newark, New Jersey.
- **March 12, 2012** "Chaotic dynamics in granular flows from the Eulerian and Lagrangian perspectives," MIME Seminar Series, Oregon State University, Corvallis, Oregon.
- **October 6, 2010** "Mixing Things Up with Dynamical Systems," Department of Mathematics and Department of Physics Seminar Series, Elmhurst College, Illinois.
- **September 10, 2010** "Two case studies in nonlinear Fourier analysis: Ocean internal solitary waves and the Zabusky–Kruskal solitons," Department of Chemical and Biological Engineering Seminar, The University of Sheffield, United Kingdom.
- **May 6, 2010** "Mixing by cutting and shuffling in tumbled granular flows," Fluids and MHD Seminar, Department of Applied Mathematics, University of Leeds, United Kingdom.
- **April 27, 2007** Ivan Christov, Bojan Popov, Peter Popov, "Nonoscillatory Central Schemes on Unstructured Meshes and Applications," ExxonMobil Upstream Research Company, Houston, Texas.
- **March 1, 2007** "A Short Introduction to the Theory and Numerics of First-Order Hyperbolic PDEs," Graduate Student Seminar, Department of Mathematics, Texas A&M University, College Station, Texas.
- **November 2, 2006** "Nonoscillatory Central Schemes on Unstructured Triangulations for Hyperbolic Systems of Conservation Laws," Department of Mathematics Colloquium, University of Louisiana at Lafayette.
- **August 17, 2005** "Solitary Internal Waves in the Ocean: The Scattering Transform Perspective," Acoustic Simulation, Measurements and Tactics Branch, Naval Research Laboratory, Stennis Space Center, Mississippi.
- **August 5, 2005** "Nonlinear Fourier Analysis: The Direct & Inverse Scattering Transforms for the Korteweg–de Vries Equation," Acoustics Division, Naval Research Laboratory, Stennis Space Center, MS and Washington, DC.

Conferences:

- **November 24, 2014** (Contributed) Ivan C. Christov, Howard A. Stone, "Continuum modeling of diffusion and dispersion in dense granular flows," 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, San Francisco, California.
- **September 12, 2014** (Invited) Ivan C. Christov, Avinash Khare, Avadh Saxena, "Kinks and their statistical mechanics in higher-order scalar field theories," IUTAM Symposium on Complexity of Nonlinear Waves, Tallinn, Estonia.
- **July 7, 2014** (Contributed) "On Eigenfunction Expansion Solutions for the Start-Up of Fluid Flow," 2014 SIAM Annual Meeting, Chicago, Illinois.
- **April 5, 2014** (Contributed) "On eigenfunction expansion solutions for the start-up of fluid flow," 2014 Western Spring Sectional Meeting of the American Mathematical Society, Albuquerque, New Mexico.
- **March 3, 2014** (Contributed) Ivan C. Christov, Howard A. Stone, "Continuum modeling of diffusion and dispersion in dense granular flows," March Meeting 2014 of the American Physical Society, Denver, Colorado.
- **January 7, 2014** (Invited) Zhong Zheng, Ivan C. Christov, Howard A. Stone, "Second-kind Self-similarities for Gravity Currents in Heterogeneous Porous Media," The Fourth Collaborative Workshop Initiative, Oxford, United Kingdom.

- **November 26, 2013** (Contributed) Ivan C. Christov, Vincent Cognet, Howard A. Stone, "Flow rate–pressure drop relation for deformable shallow microfluidic channels," 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Pittsburgh, Pennsylvania.

- **June 11, 2013** (Invited) Zhong Zheng, Ivan C. Christov, Howard A. Stone, "Influence of Heterogeneity on Second-kind Self-similar Solutions for Gravity Currents," Minisymposium on Advances in Modeling and Computation of Thin Liquid Films in Materials Science - Part I of II, 2013 SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, Pennsylvania.

- **May 20, 2013** (Invited) Ivan C. Christov, Howard A. Stone, "Anomalous diffusion in granular flow: fractional kinetics or intermediate asymptotics?," Minisymposium on Granular Flows from a Dynamical Systems Perspective, 2013 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah.

- **March 27, 2013** (Invited) "Variational approximation of repelling and attracting solitons in coupled nonlinear Schrödinger equations," Special Session on Modeling and Wave Phenomena in Nonlinear Continuum Mechanics, 8th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.

- **November 19, 2012** (Contributed) Ivan C. Christov, Howard A. Stone, "Resolving a paradox of anomalous scalings in the diffusion of granular materials," 65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, San Diego, California.

- **November 2, 2012** (Invited) "Pseudolocalized three-dimensional solitary waves as quasi-particles, the legacy of Prof. C.I. Christov," 2012 Lloyd Roeling UL Lafayette Mathematics Conference, Lafayette, Louisiana.

- **October 30, 2012** (Contributed) Ivan C. Christov, Howard A. Stone, "Intermediate Asymptotics of Axial Diffusion of Tumbled Granular Materials," 2012 AIChE Annual Meeting, Pittsburgh, Pennsylvania.

- **July 4, 2012** (Invited) "Dissipative acoustic solitons," Special Session on Nonlinear PDEs and Control Theory with Applications, 9th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida.

- **May 26, 2012** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "Pattern formation and destruction in chaotic granular flows: Strange eigenmodes at finite Peclet number," Poster Session, Workshop on Active Jammed Systems, New York City, New York.

- **February 28, 2012** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "From streamline jumping to strange eigenmodes: Learning from simple continuum models of granular mixing," March Meeting 2012 of the American Physical Society, Boston, Massachusetts.

- **January 4, 2012** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "Pattern formation and destruction in chaotic granular flows: Strange eigenmodes at finite Peclet number," Poster Session, Dynamics Days 2012, Baltimore, Maryland.

- **November 20, 2011** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "Strange eigenmodes of chaotic granular flow in a tumbler," 64th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Baltimore, Maryland.

- **July 20, 2011** (Invited) "Dynamics of Polarization in Soliton Collisions in Coupled Nonlinear Schrodinger Equations," Minisymposium on Solitons and Nonlinear Integrable Systems, 7th International Congress on Industrial and Applied Mathematics, Vancouver, Canada.

- **May 22, 2011** (Invited) Ivan Christov, Richard M. Lueptow, Julio M. Ottino, Rob Sturman, Stephen Wiggins, "3D Aspects of Mixing and Transport in Tumbled Granular Flow," Minisymposium on Different Faces of Mixing, 2011 SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah.

- **April 5, 2011** (Invited) "Interactions of dissipative solitons in a weakly-nonlinear acoustic Euler-α model," Recent trends in nonlinear wave phenomena—Achievements and challenges: A symposium dedicated to Prof. Christo I. Christov on the occasion of his 60th birthday, 7th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.

- **January 25, 2011** (Contributed) "Structure of 3D chaotic transport in a tumbled granular flow in a sphere," International Workshop on Physics of Mixing, Lorentz Center, Leiden, The Netherlands.

- **November 23, 2010** (Contributed) Ivan C. Christov, Richard M. Lueptow, Julio M. Ottino, Rob Sturman, Stephen Wiggins, "3D aspects of mixing and transport in tumbled granular flow," 63rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Long Beach, California.

- **November 19, 2010** (Contributed) Ivan C. Christov, Emre D. Yildiz, Julio M. Ottino, Richard M. Lueptow, "Mixing by cutting and shuffling in quasi-2D granular flows," 2nd Annual Meeting of the Prairie Section of the American Physical Society, Chicago, Illinois.

- **September 9, 2010** (Contributed) I.C. Christov, R.M. Lueptow, J.M. Ottino, R. Sturman, S. Wiggins, "3D aspects of mixing and transport in tumbled granular flow," Dynamics Days Europe 2010, Bristol, United Kingdom.

- **April 12, 2010** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "Chaotic granular mixing in quasi-two-dimensional tumblers: streamline jumping, piecewise isometries and strange eigenmodes," Poster Session, IMA Workshop on Transport and Mixing in Complex and Turbulent Flows, Minneapolis, Minnesota.

- **January 5, 2010** (Contributed) Ivan C. Christov, Julio M. Ottino, Richard M. Lueptow, "Chaotic granular mixing in quasi-two-dimensional tumblers: streamline jumping and piecewise isometries," Poster Session, Dynamics Days 2010: International Conference on Chaos and Nonlinear Dynamics, Evanston, Illinois.

- **November 22, 2009** (Contributed) Ivan Christov, Julio M. Ottino, Richard M. Lueptow, "Granular mixing in quasi-two-dimensional tumblers with a vanishing flowing layer," 62nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Minneapolis, Minnesota.

- **June 2, 2009** (Invited) "Thermal shock waves under a Maxwell–Cattaneo model with temperature-dependent conductivity," Symposium on Second-Sound and Thermal Shock Phenomena, 8th International Congress on Thermal Stresses, Urbana-Champaign, Illinois.

- **March 25, 2009** (Invited) "Hidden solitons in the Zabusky–Kruskal experiment: Analysis using the periodic, inverse scattering transform," Special Session on Nonlinear Wave Phenomena in Discrete and Continuous Models, 6th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.

- **May 18, 2008** (Invited) "The coarse-grain description of interacting sine-Gordon solitons with varying widths," Special Session on Nonlinear Waves and Solitons, 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, Arlington, Texas.

- **April 16, 2007** (Invited) "Internal solitary waves in the ocean: Analysis using the periodic, inverse scattering transform," Special Session on Nonlinear Wave Phenomena in the Physical Sciences: Some Recent Studies, 5th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.

- **January 4, 2007** (Contributed) C.I. Christov, Ivan Christov, "Dynamics of Quasi-Particles in Nonlinear Wave Equations," Poster Session, Dynamics Days 2007: an International Conference on Chaos and Nonlinear Dynamics, Boston, Massachusetts.

- **November 16, 2006** (Contributed) "Nonoscillatory Central Schemes on Unstructured Triangulations for Hyperbolic Systems of Conservation Law," Minisymposium on Numerical Methods for First-Order PDEs, 8th IMACS International Symposium on Iterative Methods in Scientific Computation, College Station, Texas.

- **August 20, 2006** (Contributed) "On the Application of Godunov-type Schemes to Conservation Laws Arising from the Equations of Nonlinear Acoustics," Special Session on Numerical Methods for Hyperbolic Problems, 6th International Conference on Numerical Methods and Applications, Borovets, Bulgaria.

- **July 12, 2006** (Contributed) Ivan Christov, Bojan Popov, Peter Popov, "Nonoscillatory Central Schemes on Unstructured Triangular Grids for Hyperbolic Systems of Conservation Laws," 2006 SIAM Conference on Analysis of Partial Differential Equations, Boston, Massachusetts.

- **January 5, 2005** (Contributed) "On the Wavelet-Galerkin Solution to the KdV Equation," MAA Undergraduate Poster Session at the annual Joint Mathematics Meetings, Atlanta, Georgia.

- **July 20, 2004** (Contributed) "On the Wavelet-Galerkin Solution to the KdV Equation," Texas A&M University's REU/VIGRE Student Mini-Conference.

- **April 24, 2004** (Contributed) "A Wavelet Method for Image Anti-Aliasing," Research by Undergraduates in Mathematics Boston University Symposium.
- **July 22, 2003** (Contributed) "Wavelet-Galerkin Methods for Differential Equations," Texas A&M University's REU/VIGRE Student Mini-Conference.

Teaching & Mentorship Experience:

- Co-directed the research of a Los Alamos post-baccalaureate student on the theory of interactions of compact waves ("compactons") in a class of nonlinear evolution equations with Hamiltonian structure (Spring 2014–present).
- Co-directed the research of a Los Alamos undergraduate research assistant on the theory and simulation of interactions of peaked compact waves under a theory of dispersion in materials with an inherent length scale (Summer 2014).
- Co-advised three Princeton graduate students on research projects on (i) modeling of Taylor–Aris dispersion of suspensions, (ii) multi-phase interfacial instabilities in deformable geometries (see publication #27), and (iii) gravity current propagation in porous media, see publication #29 (2011–2012 and 2012–2013 academic years).
- Co-directed the research of a Princeton visiting student on experimental measurements of Taylor–Aris dispersion of non-Brownian particles and flow in deformable microchannels (Summer 2012).
- Co-supervised the research of a Northwestern undergraduate student on mixing of a line segment by cutting and shuffling, see publication #24 (2009-2010 and 2010–2011 academic years).
- Prepared and taught a 4 hour seminar entitled "Chaos in Simple Systems" at the annual MIT Splash weekend (November 23, 2003).
- Prepared and taught a 5 hour seminar entitled "Chaos: An Introduction to Dynamical Systems" at the annual MIT Splash weekend (November 23–24, 2002).

Awards & Honors:

- Richard P. Feynman Distinguished Postdoctoral Fellowship at the Los Alamos National Laboratory funded through the Laboratory Directed Research & Development program at Los Alamos National Laboratory.
- NSF Mathematical Sciences Postdoctoral Research Fellowship funded through NSF grant DMS-1104047 (PI: I.C.C.).
- Best Student Paper Award, 7th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory.
- Best Student Paper Award, 6th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory.
- Walter P. Murphy Fellowship for graduate study at Northwestern University (2007–2008, 2008–2009 and 2009–2010 academic years).
- Regents Fellowship for graduate study at Texas A&M University (2005–2006 academic year).

Conference Travel Awards:

- Travel Award to attend the 9th AIMS International Conference on Dynamical Systems, Differential Equations and Applications funded through NSF grant DMS-1204497.
- Travel Award to attend the 2011 International Congress on Industrial and Applied Mathematics (ICIAM) funded through NSF grant DMS-1004827.
- SIAM Student Travel Award to attend the 2011 SIAM Conference on Applications of Dynamical Systems.
- Student Travel Award to attend the 7th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory funded through NSF grant DMS-1048816.
- Travel Grant from The Graduate School at Northwestern University to attend the 63rd Annual Meeting of the Division of Fluid Dynamics of the American Physical Society.

- Travel Grant from The Graduate School at Northwestern University to attend the 62nd Annual Meeting of the Division of Fluid Dynamics of the American Physical Society.
- Student Travel Award to attend the 6th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory funded through NSF grant DMS-0840362.
- Travel Grant from The Graduate School at Northwestern University to attend the 61st Annual Meeting of the Division of Fluid Dynamics of the American Physical Society.
- Travel Award to attend the 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications funded through NSF grant DMS-0738356.
- Student Travel Award to attend the 5th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory funded through NSF grant DMS-0631857.
- Travel Grant to attend Dynamics Days 2007: an International Conference on Chaos and Nonlinear Dynamics.
- SIAM Student Travel Award to attend the 2006 SIAM Conference on Analysis of Partial Differential Equations.

Workshop Participation:

- 30th Annual Workshop on Mathematical Problems in Industry at the New Jersey Institute of Technology; received funding from NSF Grant DMS-1261594. (Jun. 23–27, 2014)
- Institute for Mathematics and its Applications Special Workshop on Careers and Opportunities in Industry for Mathematical Scientists; received funding from the IMA. (April 7–9, 2014)
- 29th Annual Workshop on Mathematical Problems in Industry at the Worcester Polytechnic Institute; received funding from NSF Grant DMS-1261594. (Jun. 17–21, 2013); Report.
- 28th Annual Workshop on Mathematical Problems in Industry at the University of Delaware; received funding from NSF Grant DMS-1153940. (Jun. 11–15, 2012); Report.
- International Workshop on Physics of Mixing at the Lorentz Center in Leiden, The Netherlands; received funding from the Lorentz Center. (Jan. 24–28, 2011)
- NSF/CBMS Regional Conference in the Mathematical Sciences on Recent Advances in the Numerical Approximation of Stochastic PDEs at the Illinois Institute of Technology. (Aug. 9–13, 2010)
- 26th Annual Workshop on Mathematical Problems in Industry at Rensselaer Polytechnic Institute; received funding from NSF Grant DMS-0753071. (Jun. 14–18, 2010); Report.
- 7th Annual Graduate Student Mathematical Modeling Camp at Rensselaer Polytechnic Institute; received funding from NSF Grant DMS-0707280. (Jun. 8–11, 2010); Report.
- Institute for Mathematics and its Applications Workshop on Transport and Mixing in Complex and Turbulent Flows; received funding from the IMA. (Apr. 12–16, 2010)
- 12th Industrial Mathematical & Statistical Modeling Workshop for Graduate Students at the North Carolina State University; received funding from the NCSU/CRSC/SAMSI. (Jul. 24–Aug. 1, 2006)
- Louisiana State University Workshop on Harmonic Analysis and Fractal Geometry; received funding from NSF Grant DMS-0139783. (Feb. 24–26, 2006)
- Institute for Mathematics and its Applications Workshop on New Mathematics and Algorithms for 3-D Image Analysis; received funding from the IMA. (Jan. 9–12, 2006)

Service:

- Head of organizing committee for the Center of Nonlinear Studies Workshop on Grand Challenges in Geological Fluid Mechanics, Los Alamos, New Mexico, September 2–4, 2015.
- Co-organizer (with Profs. M.D. Todorov and S. Yoshida) of a special session entitled “Mathematical Modeling and Physical Dynamics of Solitary Waves: From Continuum Mechanics to Field Theory” at the 9th IMACS International conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.

- Member of the Scientific Program Committee of the 9^{th} IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia, April 1–4, 2015.
- Session chair at the 2014 Western Spring Sectional Meeting of the American Mathematical Society.
- Member of the Los Alamos Postdoctoral Association's career committee (2014 fiscal year term).
- Member of the colloquium organizing committee for the Center for Nonlinear Studies at the Los Alamos National Laboratory (2014, 2015 fiscal year terms).
- Co-organizer (with Dr. P.M. Jordan and Prof. M.D. Todorov) of a special session entitled "Modeling and Wave Phenomena in Nonlinear Continuum Mechanics" at the 8^{th} IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.
- Member of the Scientific Program Committee of the 8^{th} IMACS International conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia, March 25–28, 2013.
- Co-organizer (with Dr. R. Sturman) of a minisymposium entitled "Piecewise Isometries: Applications and Theory" at the 2011 SIAM Conference on Applications of Dynamical Systems.
- Co-organizer (with Drs. P.M. Jordan and M.D. Todorov) of a special session entitled "Recent trends in nonlinear wave phenomena—Achievements and challenges: A symposium dedicated to Prof. Christo I. Christov on the occasion of his 60^{th} birthday" at the 7^{th} IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia.
- Judge at Chicago Public Schools' Science and Math Fairs (2010), Event Supervisor at Science Olympiad—Wilbur Wright College Regional Tournament (2011).
- Elected Member-at-Large of the American Physical Society's Forum on Graduate Student Affairs (2011, 2012 calendar years term).
- Session chair at the 63^{rd} Annual Meeting of the Division of Fluid Dynamics of the American Physical Society.
- Elected Student Representative of the American Physical Society's Prairie Section (2010 calendar year term).
- Webmaster for the Texas A&M Department of Mathematics' Numerical Analysis group (2006–2007 academic year).
- Reviewed manuscripts for (regularly for bold titles):

AIAA Journal
AIChE Journal
AIP Advances
AIP Conference Proceedings
Applied Mathematical Modelling
Applied Numerical Mathematics
Applied Physics Letters
Archives of Mechanics
Central European Journal of Physics
Chemical Engineering Communications
Chemical Industry and Chemical Engineering Quarterly
Colloids and Surfaces A: Physicochemical and Engineering Aspects
Communications in Nonlinear Science and Numerical Simulation
The European Physical Journal Plus
Europhysics Letters (EPL)
International Journal of Computer Applications in Technology
International Journal of Computer Mathematics
International Journal of Differential Equations
International Journal of Engineering Science
International Journal of Non-Linear Mechanics
International Journal of Partial Differential Equations
International Scholarly Research Notices
Journal of Applied Mathematics and Computing
Journal of Mech. Eng. Science—Proc. IMechE Part C
Journal of Physics A: Mathematical and Theoretical
Journal of Zhejiang University—SCIENCE A
Lecture Notes in Earth Sciences
Mathematical Biosciences and Engineering
Mathematical Methods in the Applied Sciences
Mathematics and Computers in Simulation
Mechanics Research Communications
Mathematical Modelling and Analysis
Meccanica
New Journal of Physics
Nonlinear Analysis A: Theory, Methods & Applications
Nonlinear Analysis B: Real World Applications
Nonlinear Analysis C: Hybrid Systems
Nonlinear Analysis: Modelling and Control
Philosophical Transactions of the Royal Society A
Physica D
Physica Scripta
Physical Review E
Physical Review Letters
Physics Letters A
Physics of Fluids
Proceedings of the Natl Acad. of Sci. of the USA

Journal of Engineering Mathematics
Journal of the Egyptian Mathematical Society
Journal of Fluid Mechanics
Journal of Fluids Engineering—Transactions of the ASME
Proceedings of the Royal Society A
Studies in Applied Mathematics
Wave Motion
Zeitschrift für Naturforschung A

- Reviewed proposals for (regularly for bold titles):

  American Chemical Society Petroleum Research Fund
  Ministry of Education and Science of the Republic of Kazakhstan

- Reviewer for *Mathematical Reviews* database of the American Mathematical Society (MathSciNet).

Skills:

- C++, C, FORTRAN 77, Java, LaTeX, HTML, JavaScript, CSS.
- MATLAB, MATHEMATICA, `deal.II` finite element library, some experience with the `LAMMPS` and `LIGGGHTS` molecular/particle dynamics simulators, Adobe Illustrator.
- System administration of Mac OS X, various flavors of Linux/Unix and Microsoft Windows.
- Fluent in English (native) and Bulgarian (native); conversational knowledge of French and Spanish.

Professional Memberships:

American Physical Society (APS), Society for Industrial and Applied Mathematics (SIAM), Society of Petroleum Engineers (SPE), American Mathematical Society (AMS), National Postdoctoral Association (NPA)

Scientometrics:

- *h*-index: 8 (source: Web of Science®).
- Citations: 213 (source: Web of Science®) or 273 (source: personal count excluding self-citations).